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Editorial

Statistical tools in ethnopharmacology

Strategies for quantifying and for quantitatively analysis ethnobotanical information have been one of the key challenges of the discipline (Leonti et al., 2009). One early and highly influential approach was developed by Daniel E. Moerman (Univ. Michigan) and suggested the use of regression analyses in order to assess the relative importance specifically of plant families (Moerman, 1979, 1996). Importantly, his contribution is very much based on a comparison of existing data derived from a large number of field studies (Moerman, 1998 and previous editions). Key to the argument of the author has been to contribute to an anthropological understanding of plant usage and specifically to understanding how plants are selected. He and others (e.g. Ortiz de Montellano, 1975; Etkin, 1988) put the myth to rest that indigenous people selected medicinal plants more or less at random (and as he points out in this issue it does raise a whole series of important scientific questions). One of us (MH) had carefully followed this debate and later contributed in a variety of ways (Heinrich, 2003; Leonti et al., 2003). At this time this novel approach was without doubt groundbreaking.

The relevance of reliable, comparable and if possible quantifiable ethnobotanical information has been one of the key outcomes of this discussion and it resulted in a "setting standards" paper on how to deal with ethnopharmacological and ethnobiological data (Heinrich et al., 2009). Already in the preparation there was quite some discussion about this. For the journal we have ever since required that in one way of the other quantitative data needs to be included to have some measure for the importance of the information. Later in an editorial one of us advocated the creation of a database for ethnopharmacological information (Verpoorte, 2008), to eventually be able to download all the data from a survey in the format of the database and this way create one repository for all this information. This would allow datamining and the analysis of all the data in different ways.

Weckerle et al. (2011) now explore the use of Bayesian approach as an alternative statistical tool. This is a stochastic process and as such takes of the number of species used and the size of the families into account. There is agreement between both Moerman (2012) and Leonti et al. (2012), that regression analysis favours larger families, but their analysis also shows that the overall outcome is similar independent of which of the two methods is used (Moerman, 2012, Table 1).

The editors of the journal very much appreciate such discussions as they will help us all to improve the research in the field of ethnopharmacology. For this paper (Weckerle et al., 2011) and the commentary as well as the authors' response we want to draw this discussion to a close within the journal, but it will certainly continue to spark lively debates within the scholarly community. *The most important conclusion is that data from ethnopharmacological data can be used in a wider context using various bioinformatics tools to look at the data in different ways.* Importantly, statistics, by definition, is a tool which helps one to analyze data. Most valuable for us as researchers is that there are many methods to extract novel information or assess the value of information from databases. It is a typical systems approach of first collecting data and then getting a more profound insight by using, for example, regression or Bayesian analysis. Particularly using such approaches to identify possible lead species has, like any screening, the risk of missing some active ones. Whether this is acceptable or not depends on the objectives of your research: novel leads or evidence based traditional medicines or a more detailed understanding of local and traditional medical systems.

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